

Test Results for RD3c, a Nb₃Sn Racetrack Dipole Magnet

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The Superconducting Magnet group at Lawrence Berkeley Laboratory has been developing racetrack technology for economical, high-field accelerator magnets from brittle superconductor. Recent tests have demonstrated 1) robust, reusable, double-layer, flat racetrack, wind & react Nb₃Sn coils, 2) a reusable, easily assembled, coil-support structure that can minimize conductor movement, and 3) 15T dipole fields, with no degradation. RD3c is our first attempt to compare measured and calculated field harmonics. A single-layer, Nb₃Sn, flat racetrack inner-coil was wound on both sides of a bore-plate, and then reacted and potted (as previously). However, hard spacers were wound into the inner coils, to adjust the geometric field harmonics, and identify any ill effects of hard-spacers. Harmonic measurements with a warm rotating coil also required a considerably thicker bore-plate (for the 35mm OD anti-cryostat). The inner coil-module was sandwiched between two existing outer-coil modules, and pre-stressed within the reusable yoke & shell loading structure. The magnet's performance is discussed, and compared with calculations.

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